

Local Integration of the National Atmospheric Release Advisory Center with Cities (LINC)

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This article was submitted to
Public Technology, Inc. Annual Conference Local Governments"
Secure and On the Go, Scottsdale, AZ, April 11-13, 2002

U.S. Department of Energy

Lawrence
Livermore
National
Laboratory

March 25, 2002

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Introduction

The objective of the *Local Integration of the National Atmospheric Release Advisory Center with Cities (LINC)* program is to demonstrate the capability for providing local government agencies with an advanced operational atmospheric plume prediction capability, which can be seamlessly integrated with appropriate federal agency support for homeland security applications. LINC is a Domestic Demonstration and Application Program (DDAP) funded by the Chemical and Biological National Security Program (CBNP), which is part of the Department of Energy's (DOE) National Nuclear Security Administration (NNSA). LINC will make use of capabilities that have been developed by the CBNP, and integrated into the National Atmospheric Release Advisory Center (NARAC) at Lawrence Livermore National Laboratory (LLNL). NARAC tools and services will be provided to pilot study cities and counties to map plumes from terrorism threats. Support to these local agencies will include training and customized support for exercises, special events, and general emergencies.

NARAC provides tools and services that map the probable spread of hazardous material which have been accidentally or intentionally released into the atmosphere. Primarily supported by the DOE, NARAC is a national support and resource center for planning, real-time assessment and detailed studies of incidents involving a wide variety of hazards, including radiological, chemical, or biological releases. NARAC is a distributed system, providing modeling and geographical information tools for use on an end user's computer system, as well as real-time access to global meteorological and geographical databases and advanced three-dimensional model predictions.

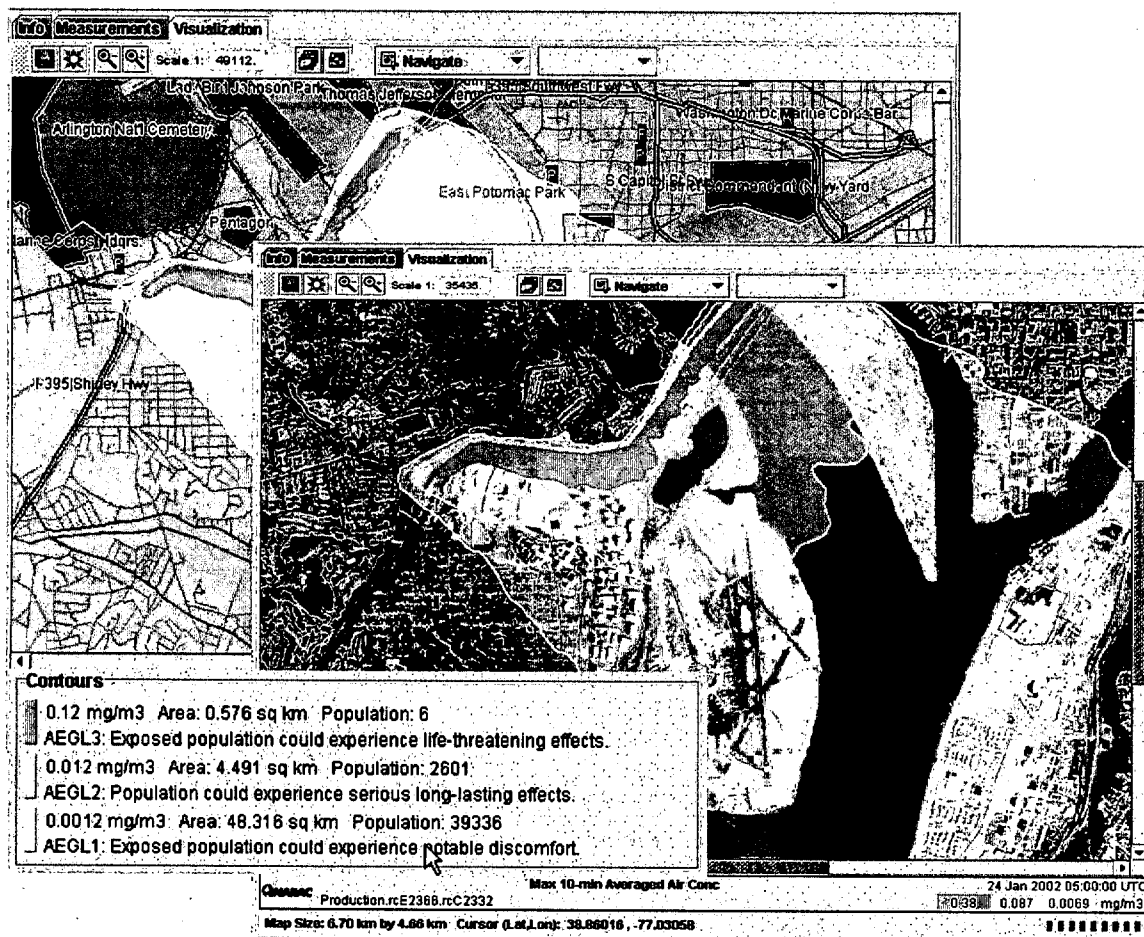
NARAC Tools and Services

NARAC has a distributed set of plume modeling and geographical information display software tools for end users, such as emergency planners, managers and responders. These include the following:

- Tools to allow a user to enter the information necessary to describe a real or potential atmospheric release of radiological, chemical or biological material, and request a plume prediction
- Fast-running local-scale plume models for initial hazard zone estimates on the end user's computer
- Internet-based and web-based tools for accessing the advanced plume model predictions from the NARAC facility over several types of communications links (public or private network, dial-up, wireless)
- Software to display model plume predictions of areas affected by air and ground contamination, potential health effects, and affected population counts along with multiple, detailed geographical information layers (such as roads, cities, buildings, water bodies).

Users may obtain model results from the automated NARAC system without involvement of NARAC staff. However, this staff is available (on duty or on call) 24 hrs \times 7 days to provide scientific and technical assistance, as well as training. Initial predictions using local NARAC-supported tools are available in less than a minute using only the end user's computer. Fully automated NARAC central system initial predictions can be delivered in 5 to 15 minutes. NARAC then provides technical and scientific support including quality assurance of model input data and plume predictions until all airborne releases are terminated, the hazardous areas are refined and mapped by combining field measurements with model predictions, and the long-term impacts are assessed. NARAC model predictions can aid in determining health risks, recommending emergency actions (such as sheltering, evacuation, re-location, re-entry), and deploying emergency personnel. More information on NARAC can be found on the web at <http://narac.llnl.gov>.

A major component of the NARAC tool set is the *iClient* (internet client) software that resides on the end user's computer platform. The *iClient* allows primary users to enter event/scenario information, request NARAC model predictions, run local models, and display model results with geographical information (see example in figure below). This software communicates with computers at the NARAC facility at LLNL using an Internet, intranet, dial-up or wireless connection. Computationally intensive calculations, including three-dimensional model simulations and data processing, are performed on computers at the NARAC facility. However, results of previously completed calculations can be viewed using the *iClient* software without any connection to NARAC. In addition, simpler, fast-running models for the end-user's computer are being integrated with the *iClient*. These models can be used as a quick, initial screening and decision-making tool, independent of the NARAC central facility. The use of the Java platform-independent programming language for the *iClient* means that the software will run on



Example displays of a hypothetical plume prediction showing affected areas, health effects and residential population counts, along with geographical information (roads, water bodies, landmarks, aerial photograph) obtained using the NARAC *iClient* (internet client) software tools.

NARAC predictions can also be easily distributed to multiple users (such as local, state, or federal government agencies) using a complementary *NARAC Web* capability that allows authorized users to have password-controlled access to predictions from a central Web site using only a standard Web browser (e.g., Netscape or Internet Explorer). The NARAC Web server maintains a list of authorized users as well as a list of NARAC predictions that each user is authorized to view. Supplementary information is available on the Web site, including summary reports of the assumptions used to make a prediction, and guides that aid in the understanding and interpretation of NARAC models and products.

LINC Program Plan

LINC is planned as a multi-year program. In the first year, LLNL and PTI will partner with individual cities to integrate NARAC technology with existing local agency technology, and, then, test, evaluate and demonstrate the integrated operational capability for emergency preparedness and response to CB urban terrorism. In future years, the

objectives are to demonstrate support of multiple city and county agencies in a metropolitan area, and, finally, demonstrate integrated city-county-state-federal operational emergency response. The final step will be to develop long-term funding for continuous operation of an integrated, nationwide system that aids emergency preparedness and response at all levels of government.

The initial steps of the LINC effort will be to meet with local government agencies to evaluate their needs and develop plans for integration into their emergency management functions. Selection of the pilot city will be based on objective criteria mutually developed by PTI and LLNL for the overall success of the project. A series of meetings, demonstrations, and presentations will be held during PTI's Annual Conference to exchange information related to LINC with local government jurisdictions. Coordination will be provided by the PTI Urban Consortium Environmental Task Force. PTI will also establish a committee consisting of PTI member cities/counties to develop program user requirements. In addition, a training program for local users will be developed.

NARAC tools and databases will be customized to meet local government agency needs. Relevant local geographical information will be integrated into NARAC tools for plume map displays. Local meteorological data sources will be used to augment the existing NARAC real-time meteorological database, as needed. The integration effort will also involve the establishment of network communication between the NARAC facility and local agency computer systems, and the integration of NARAC software tools with local government emergency management systems.

After an integration and testing phase, NARAC support to local government agencies will include support for exercises, special events, and general emergencies. In addition to emergency response applications, plume consequence assessments can be used to understand the impact of various accident scenarios or threats, and to assess the magnitude of the required response. For example, participating organizations can use probable meteorological conditions to run numerous what-if calculations before a special event at a particular location or facility. These results can be used to assist officials in developing detailed plans for egress and for conducting real-time monitoring during the event. One or two days before special events, NARAC can forecast the local meteorological wind flows so that field monitoring teams can be pre-positioned and emergency response forces can be on alert for probable locations of potential releases and impacts.

Acknowledgment This work was performed under the auspices of the U.S. Department of Energy by the University of California, Lawrence Livermore National Laboratory under contract No. W-7405-Eng-48.